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INDIVIDUAL DIFFERENCES IN PHYSIOLOGICAL AROUSAL, ANXIETY AND PERFORMANCE OF SPORT HANG GLIDER PILOTS

by

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A THESIS

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled INDIVIDUAL DIFFERENCES IN PHYSIOLOGICAL AROUSAL, ANXIETY AND PERFORMANCE OF SPORT HANG GLIDER PILOTS submitted by James Wesley Barton in partial fulfilment of the requirements for the degree of Master of Science.

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ABSTRACT

The primary purpose of this thesis was to examine relationships between experience, autonomic arousal, anxiety, and performance in 30 male sport hang glider pilots. Level of anxiety was measured with Spielberger's Trait and State Anxiety Inventories. EKG and Respiration were monitored for each subject's flight pattern. Individual autonomic responses were noted at eight specific phases during the flight sequence.

The study demonstrated that quality of flight performance relates strongly to the way in which an individual responds autonomically during the flight sequence. The most adaptive response pattern for both novice and experienced flyers as indicated by good performers was found to be a significant increase in cardiac and respiratory response during pre flight followed by a decrease just prior to take off, and a somewhat reduced autonomic increase prior to landing. It was evident that fear about a stressful event such as hang gliding did not simply dissipate, but rather, effective performers were able to cope with pre flight anxiety and inhibit fear throughout the flight. Their less effective counterparts, novice or experienced, seemed to be considerably less capable of coping with that anxiety.

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CHAPTER I

I. INTRODUCTION

Pre-performance anxiety occurs frequently during the period of preparation for demanding performance. The failure to be able to cope with such anxiety has a debilitating effect upon performance. Coaches in general rarely recognize the importance of this phenomenon in their handling of athletes.

Pre-performance anxiety occurs when environmental cues signal the approach of threatening events. During the time of performance preparation, unexpected events may occur which increase the probability of failure. Thus, these upsetting events usually heighten psychological anxiety because they produce uncertainty in and barriers towards adequate performance preparation. The reaction of an individual to a threatening event has both physiological and psychological characteristics. The physiological features are expressed in autonomic arousal. The psychological characteristics attempt to interpret the handling of threatening events. Since the reaction to psychological stresses varies among certain individuals, performance may also vary. Fenz (1976) suggests that it is the ability to cope with the situation that will determine the quality of the performance. Recently this phenomena has begun to receive considerable scholarly interest which is primarily due to the tremendous increase in participation in threatening or stress-seeking activities such as ski diving, mountaineering, white water canoeing and hang gliding. All of which tend to cultivate a high degree of pre-performance anxiety within the normal individual. Donnelly (1976:80) suggests this need for threatening or stress-seeking stimulation varies

from person to person as a function of personality, environment, emotional response pattern, and behavioral response pattern, while Berlyne (1960) interprets an "epistemic curiosity" driving individuals to seek out stress. Other theorists of stress-seeking include Mehrabian and Russell (1974), Sales (1972), Zukerman (1970), Eysenck (1970), Jacobs (1974) and Vanek (1974).

Hang gliding typifies a very high level of stress-seeking. It involves an intensely stressful situation, where concern is over life itself; it is not entered into casually, and even as the pilot gains skill in hang gliding, the sport continues to demand a great deal of personal commitment. Pre-performance anxiety is a very real factor for the hang glider pilot. Much of his energy is spent defending against his own fears of failure which could possibly result in death itself.

The present study attempts to begin this task of unfolding the ramifications of pre-performance anxiety as it relates to performance of hang glider pilots.

II. THE PROBLEM

The central purpose of this study was to investigate the relationship between anxiety and performance in hang glider pilots. Specific sub-problems pursued relative to this central purpose were:

1. To observe and evaluate the level of autonomic arousal and anxiety present in novice and experienced hang glider pilots of differing performance effectiveness.
2. To examine the relationship between situational anxiety (STATE) and anxiety proneness (TRAIT) in hang glider pilots.
3. To examine the relationship between anxiety and arousal levels and performance in beginning and experienced hang glider pilots.
4. To examine the relationship between autonomic arousal and performance of good and poor performers from among experienced and novice hang glider pilots.
5. To derive a more precise and comprehensive hypothesis relating arousal and anxiety to performance.

III. NEED FOR THE STUDY

Considerable research in the area of pre-performance anxiety has not resulted, as one might have hoped, in a clear understanding of this pervasive phenomenon. Martens' (1971) attributes the major deterrents to a more rapid progress as the failure to clearly define pre-performance anxiety and related terms as empirical and theoretical constructs. The proposal by Spielberger (1966) to distinguish between state and trait anxiety, initiated an attempt at the more precise definition of the concept, "anxiety". However, pre-performance anxiety still remains a relatively unresearched area due to lack of appropriate measuring devices. Fenz (1972) utilized telemetric methods to measure heart rate and respiration rate of sport parachutists. Outside of his research very little has been accomplished in assessing pre-performance anxiety in stress-seeking activities.

Pre-performance anxiety is a fundamental part of every athlete's psychological make up. It is present in every form of demanding activity, and yet it is the most widely ignored area of concern by coaches. Lack of research and knowledge of how to cope with this behavior are the major reasons.

The present thesis will attempt to bring new insight into what actually takes place during pre-performance anxiety and how pre-performance anxiety affects performance.

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IV. DEFINITION OF TERMS

For the purpose of this study, the following definitions were employed:

ANXIETY: A specific emotional state which consists of unpleasant, consciously perceived feelings of nervousness, tension and apprehension, with associated activation or arousal of the autonomic nervous system.

STATE ANXIETY: A transitory emotional condition or state of the human organism that varies in intensity and fluctuates over time or situation.

TRAIT ANXIETY: Relatively stable individual differences in anxiety proneness.

EMOTIONS: Complex, qualitatively different, feeling states or conditions of the human organism that have both phenomenological and physiological properties.

STRESS: A very broad class of problems differentiated from other problem areas dealing with any demands which tax the system, be it physiological, social or psychological, and the responses of that system.

COMPETITION: Competition is that situation in which an individual's success is determined by some characteristics of his response relative to that of another individual.

AUTONOMIC AROUSAL: The level of arousal refers to the extent of release of potential energy stored in the tissues of an

organism, as this is evidenced in activity or response. A subject's arousal level in this study is operationally defined by deviations in his heart rate from a resting level.

PERFORMANCE: Performance is the rating received on a single trial, by a hang glider pilot based on overall flight pattern and target accuracy.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

While there is little research which bears directly upon this study, there are some relevant points of view concerning pre-performance anxiety which do bear directly upon it. A review of these points will be made, followed by, current hypotheses relating pre-performance anxiety to performance.

REVIEW

Much of the research investigating the relationship between anxiety and motor performance has been formulated in terms of the Hull-Spence drive theory.

> "Drive theory proceeds from the basic assumption that the excitatory potential, which determines the strength of a given response, is a multiplicative function of total effective drive state and habit strength." (Spence and Spence 1966:37).

Drive theory predicts a linear relationship between drive level and performance. Experimental evidence has recommended that drive theory be abandoned and that other theoretical approaches be considered. (Spielberger, 1966; Duffy, 1962).

Among these alternative approaches, the inverted U hypothesis and the Yerkes Dodson Law was formulated (Duffy 1962). The theory assumes an optimal physiological activation of the organism for optimal performance. The more one's physiological activation varies either way around this optimal point, the more performance decreases. According to this theory, performance either increases or decreases as the subject's anxiety increases, depending on the complexity of the task, the degree of stress which the subject operates under, and whether or not he is performing a learned or unlearned task. Duffy's research (1962) typifies this theory.

The relationship between anxiety level at certain stages of sport performance has been investigated by many researchers. Lampman (1966) investigated pre-meet anxiety responses of varsity swimmers at the University of Florida. The most important conclusions of the study were: 1. Low anxious athletes perform better if their pre-meet anxiety is low; 2. High anxious athletes perform better if their pre-meet anxiety is high.

Miller (1960) investigated the effects of emotional stress on track and field performance. Emotional stress was measured with the aid of a confidence rating check list containing adjectives related to the athletes' feelings at the time of competition. Performance was evaluated by the coach. A significant relationship between emotional stress and performance was found. Another observation was that emotional stimulation, while beneficial to a certain point, has a threshold above which the result is less efficient performance. From physiological measures (respiration and heart rate) a significant difference between good and poor performers was noted.

Carder (1965) investigated the relationship between anxiety scores of football players and their level of football performance. The central

hypothesis tested in this study was the greater a subject's anxiety, the higher will be the level of his football performance. The results, however, indicated no significant relationship between anxiety scores and total football performance.

In a study by Knapp (1960), emotional reactions of female gymnasts to gymnastic competition as a function of time was monitored by physiological measures (galvanic skin response, heart rate, and reaction time). The results showed that the physiological responses monitored at different phases throughout the gymnastic competition, showed significant differences among performing individuals. The novice gymnasts were shown to be under more stress by the physiological measures taken, than middle and experienced groups.

Ginn (1954) measured physiological response patterns associated with non and pre-competitive situations in swimmers, basketball players and track athletes. Results did not reveal any significant differences between non and pre-competitive situations. Other early studies on the relationship between pre-performance anxiety and performance include Johnson (1949), Harmon (1952), Church (1962), Maller (1963), Nelson (1962), Moede (1931), Hebb (1953), Duffy (1962), Malmo (1966) and Spence (1966). The evidence of a strong relationship between pre-performance anxiety and performance was a result of their research.

Spielberger (1966) believed that many serious methodological deficiences regarding the measurement of pre-performance anxiety in early studies resulted in error. He contended that the conceptual status of anxiety has been muddled by a failure to distinguish between state and trait anxiety. According to Spielberger,

> "Anxiety states are characterized by subjective, consciously perceived feelings of apprehension and tension, accompanied by or associated with activation or arousal of the autonomic nervous system." (p. 17).

Trait anxiety, on the other hand, is

> "a motive or acquired behavioral disposition that predisposes an individual to perceive a wide range of objectively non-dangerous circumstances as threatening and to respond to these with state anxiety reactions disproportionate in intensity to the magnitude of the objective danger." (p. 17).

In Spielberger's conception of anxiety, A-State is characterized primarily by the intensity of anxiety as an emotional state at a particular moment in time whereas A-Trait is characterized primarily by the frequency with which an individual experiences anxiety states. Spielberger (1966) observed that persons who are high A-Trait are particularly threatened in situations which pose direct or implied threats to self-esteem. Since these individuals were persons who fear failure, it might be expected that they will manifest higher levels of A-State in situations that involved psychological threats to self-esteem rather than physical danger. In more recent years the conceptualization of anxiety and arousal has lead to more accurate hypotheses regarding pre-performance states of emotion.

Martens (1972:37) states that,

> "Anxiety is a state that influences behavior along two dimensions, intensity and direction."

Direction is an alternative which allows the individual to approach or avoid the situation. The intensity dimension implies a condition of the organism varying on a continuum from deep sleep to intense excitement which has been termed arousal.

According to Cratty (1968), Husman (1969), and Oxendine (1968), the

optimum level of arousal varies with the particular motor task. Different tasks require different levels of arousal for the most effective performance. In addition, the optimum arousal state varies from person to person. For example, high anxiety versus low anxiety, extraversion versus introversion, and experience versus non-experience are some of the individual variables making it difficult to establish definitive guide-lines for all persons.

The following generalizations are offered on the arousal-performance topic based on research evidence: (Oxendine, 1973).

1. A high level of arousal is essential for optimal performance in gross motor activities involving strength, endurance and speed. (i.e. push-ups).

2. A high level of arousal interferes with performance involving complex skills, fine muscle movements, co-ordination, steadiness, and general concentration (i.e. archery).

3. A slightly above average level of arousal is preferable to a normal or sub-normal arousal state for all motor tasks.

It is suggested by many leading sport psychologists, Oxendine (1970), Martens (1971), and Cratty (1973) regarding pre-performance anxiety that an optimum level seems to be needed to perform well. However, this optimum level of anxiety is specific to the activity engaged in. It is suggested by Oxendine (1970) that relatively uncomplicated skills, involving primarily strength and endurance are better accomplished during an extremely anxious state than a reduced anxious state. Whereas fine motor skills which required a certain amount of dexterity are best served by a less anxious state. Therefore the effects of anxiety may have an enhancing effect upon performance or a debilitating effect depending upon

the level of anxiety, experience and the nature of the activity.

Singer (1972) states that

> "in competition athletes who score extremely high or low in anxiety should be placed in situations which will allow them to perform the types of skills best suited to their temperment". (1972:126).

Klavora (1975) tested Singer's hypothesis by investigating the effects of different athletic environments on emotional arousal of participants. High school football players who were divided into seven playing groups based on skill performance and anxiety were the subjects of the study. The design of the study called for repeated administration of Spielberger's STAI anxiety scale throughout the playing season during three different experimental athletic environments: practice, regular games, and playoffs. Performance was assessed after every game by the the coach. The results indicated no significant differences in optimal pre-competition emotional arousal level in football players who were playing different positions, suggesting that playing positions in football do not differentially affect emotional arousal in the individuals playing these positions.

Carron (1971) indicates three major limitating factors concerning level of anxiety and optimal performance: 1. The apparent differences in subject's responses to similar stressful conditions; 2. The quantification or objective measurement of state anxiety; and 3. The apparent interaction of state anxiety with motor task difficulty.

According to Spielberger (1972) and McAdoo (1970), the appraisal of a particular stimulus or situation as threatening is influenced by a person's abilities and past experiences, as well as by his level of A-Trait and the objective danger that is inherent in the situation. Often encountered stressful stimuli may lead an individual to develop effective

coping responses that may reduce the level of A-State intensity. This would depend on how well an individual's defense processes develop as a function of the frequency of the threatening situations an individual is in.

Fenz (1976) in an attempt to determine the extent of individual differences in physiological arousal and performance among sport parachutists monitored heart rate and respiration rate throughout various timed stages of jump preparation. The subjects were divided into two groups, novice and experienced; their performance was rated by an experienced jump master. The results showed that the way in which a person responds autonomically during the jump sequence relates to his jumping skill. Individual differences arose in the ability to cope with fear of a stressful event. The good performers, especially among the experienced jumpers, suggest anticipatory control. It was further concluded that,

> "through repeated successful exposure to a source of stress, a subject learns to attend to the more low relevant, anticipatory cues, which act as "get ready" or "warning" signals for the forthcoming danger. The ability to respond to these "warning" signals and to be able to initiate and carry through mechanisms responsible for the inhibition, or control of anxiety, is adaptive and related to performance." (Fenz, 1976: 101).

On the basis of the above review of literature on pre-performance anxiety, three research questions have been derived. Where indicated, the rationale for the hypotheses has been given.

<u>Research Question 1</u>: That sport performance evokes pre-performance anxiety in all participants. This transitory A-State is significantly higher than A-Trait experienced by the same performers in non-sport performance situations.

<u>Research Question 2:</u> That sport performers at higher skill levels experience less pre-performance anxiety than performers at lower skill levels.
<u>Rationale</u>: It is assumed that athletes at higher levels of performance are more experienced and have developed effective coping responses to reduce the intensity of pre-performance anxiety.

<u>Research Question 3:</u> That good and poor performers in the same sport performance situation should differ from each other with respect to physiological arousal. (Heart Rate and Respiration Rate).
<u>Rationale</u>: Good performers have learned to control their cognitive and emotional responses in such a way as to enhance performance.

CHAPTER III

METHODS AND PROCEDURE

Sport hang glider pilots on two different levels of experience were monitored for physiological responses during a single flight. Anxiety inventories were administered under two conditions: stressful (State Anxiety) and non-stressful (Trait Anxiety) conditions. During the flight, the performance of each experimental subject was evaluated by a qualified instructor. Individual differences, physiological responses, anxiety and performance were then studied for the two levels of experience.

I. EXPERIMENTAL DESIGN

The experimental design was a block design using a two-factor analysis of variance with repeated measures on the second factor. There were two levels of the first factor, experience, novice and experienced hang glider pilots. The time factor included eight different phases throughout the flight sequence.

The dependent variables were state and trait anxiety levels, respiration rate in cycles per minute and heart rate in beats per minute.

II. THE SUBJECTS

The subjects (Ss) of the study were thirty male hang glider pilots from Edmonton, Alberta. Their ages ranged from seventeen to twenty-six

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

years, the mean age being 22.9 years.

The sample consisted of 15 novice and 15 experienced sport hang glider pilots. Novice pilots had made less than ten flights prior to testing. For the experienced hang glider pilot, the minimum criterion was 100 flights.

Selection of an experienced or a novice jumper in testing, followed no special order; the time of testing was influenced mainly by the availability of subjects and by weather conditions.

III. THE SETTING

The testing site was located at Government Hill, Edmonton, Alberta. The hill had a vertical elevation of approximately 120 feet and a slope of approximately 55 degrees.

The flight path was relatively free from adverse obstructions. Horizontal distances covered for successful flights to the target area were approximately 375 feet.

Each subject had made previous flights at this location and was familiar with the most prevalent wind directions and landing areas, thus controlling for the novelty or surprise factors.

According to hang glider instructors in the Edmonton area, Government Hill is given a classification of excellent for beginner hang glider pilots, provided the wind conditions were ideal in terms of direction and velocity. These wind conditions were obtained for all subjects through all phases of flight testing.

IV. THE APPARATUS

In this study, four measures were used: State Trait Anxiety Inventory, Instructor's Performance Evaluation Questionnaire, Heart Rate and Respiration Rate measured by an Audio Subcarrier System.

State Trait Anxiety Inventory (STAI)

The STAI as originated by Spielberger (1970) consists of separate self-report scales for measuring A-Trait and A-State (Appendix A). The A-Trait scale consists of 20 statements (e.g., "I take disappointments so keenly that I can't put them out of my mind") that ask the subject to report how he _generally_ feels; the subject rates himself on the following four-point scale: "almost never", "sometimes", "often", "almost always". The A-State scale consists of 20 statements (e.g., "I feel self-confident", "I feel nervous", "I feel jittery") that ask the S to indicate how he feels at a particular moment in time (e.g., immediately prior to the game or performance); the S checks one of the following: "not at all", "somewhat", "moderately so", "very much so". Four additional items were added to both scales. Items regarding sport, age, experience, and previous injury, were added to A-Trait scale. Item "number of minutes prior to performance" was added to A-State scale.

Instructor's Performance Evaluation Questionnaire (IPEQ)

The IPEQ was developed by the investigator on the basis of his own extensive experience within the sport of hang gliding. The performance of each pilot was evaluated by a qualified hang gliding instructor on the following three point scale: "poor performance", "average performance",

and "good performance". Flight performance evaluation was based on flight stability and landing accuracy. The quality of each subjects performance was thoroughly assessed by the instructor. Subjects were then ranked from best performer to poorest performer within each of the two experimental groups. The best performer being number one and the poorest performer being number fifteen. The good performer group consisted of the top five performers within each group. The poor performer group consisted of the bottom five performers within each group.

The Audio Subcarrier System

This system was contained within a custom designed A frame backpack which is illustrated in Figures 1 and 2. The basic system consisted of a Modulator Pack, a Tape Recorder and a Demodulator Pack. The modulator pack consisted of three modulators and a mixer. The modulators each converted a slowly varying physiological signal into a frequency modulated carrier frequency in the audio range. The modulators had different centre frequencies (500 H_2, 1450 H_2, and 4,000 H_2). The Mixer mixed these frequencies in equal proportions and reduced their amplitude to a level suitable for the input of a standard audio tape recorder.

The demodulator pack consisted of three demodulators which took the frequency modulated and converted it back to the original physiological signal on play back.

This system therefore enabled the investigator to record three slowly varying parameters which were normally below the physiological frequency response of an audio tape recorder, onto a single track of such a recorder. An Amplifier Pack was used to amplify the physiological signals to a suitable size to drive the modulator pack. The amplifier

FIGURE 1

THE AUDIO SUBCARRIER SYSTEM

A - FRONTAL VIEW

B - LATERAL VIEW

C - SURFACE ELECTRODES

A B C

pack provided, consisted of an EKG amplifier, a Respiration amplifier and a Temperature amplifier. The main power for this pack was contained in the modulator pack.

Only two parameters were used in this study; respiration rate and heart rate. Temperature was not recorded. Calibration and Instructions for Use are found in the appendix along with an electronic diagram of the complete audio subcarrier system.

V. THE TASK

The task required the subject to make one flight from the top of the hill. On a "ready" signal the subject was required to become airborne and maintain a stable unidirectional flight path to a landing target situated at the base of the hill. Each subject's heart rate and respiration rate was monitored continuously during eight specific phases of the flight sequence.

VI. PROCEDURE

The subjects were asked to read the common instructions concerning the experiment. Spielberger's Trait Anxiety Inventory was administered following general experiment instructions. Subjects were then asked to engage in the actual flight test commending on the following day on a casual come basis pending on weather conditions. Testing extended over a three week period. Each subject was administered the Spielberger's

State Anxiety Inventory prior to flight testing. Each subject was then asked to relax while the audio subcarrier system was placed on his back. This took the form of a custom designed backpack perfected to the degree where flight mechanics was not impeded. The audio subcarrier system was connected to the subject in the following manner:

a) The nasal thermistor respiration probe was placed under the nostril and in the air stream from the nose. The cable was taped to the cheek so that the probe remained in place.

b) Surface electrodes were attached to three prepared areas of the body: the manubrium, the fifty intercostal rib of the right side, and a non muscular area of the left side of the chest.

Figure 2 illustrates the audio subcarrier system and its function position and attachment on the subject.

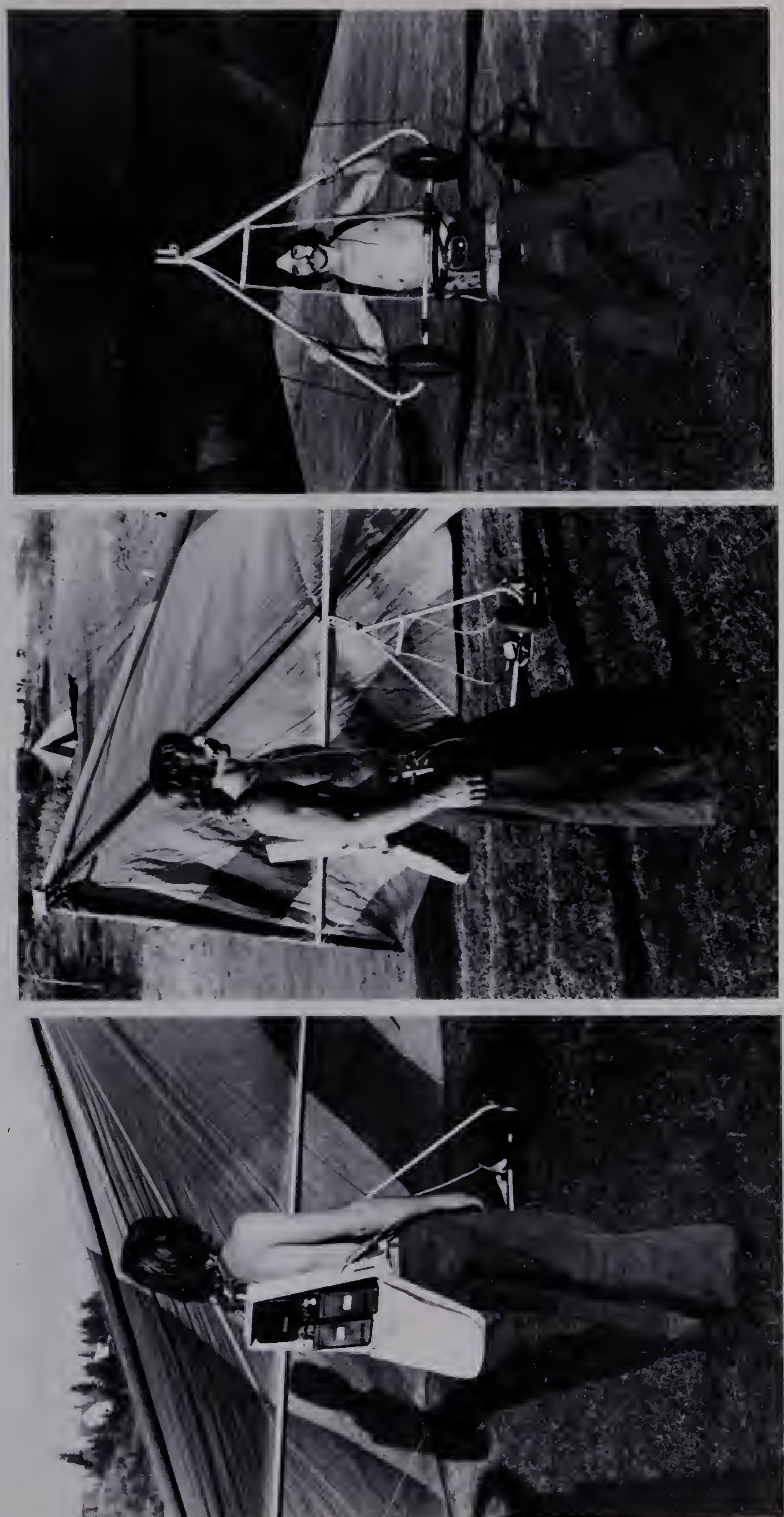
The subject was then instructed to remain stationary for 10 to 20 minutes, allowing the surface electrodes to settle down after application. The respiration probe and EKG electrodes were then plugged into the system's amplifier via a control panel which was attached from the subject's waist belt. From this control panel the system could be easily checked for any malfunctions. The subject was then instructed to take a pre-flight position at the top of the hill at which time the subject's respiration rate and heart rate commenced being recorded and continued being recorded throughout the entire flight sequence (Figure 3). The subject remained in the pre-flight position for three minutes. At the end of this time he was given a signal to begin take off procedures. Flight duration was approximately 20 seconds before landing. The subject then remained stationary in the post-landing phase for one minute, at the end

FIGURE 2

A - POSTERIOR VIEW OF THE APPARATUS ATTACHED TO SUBJECT

B - LATERAL VIEW OF THE APPARATUS ATTACHED TO SUBJECT

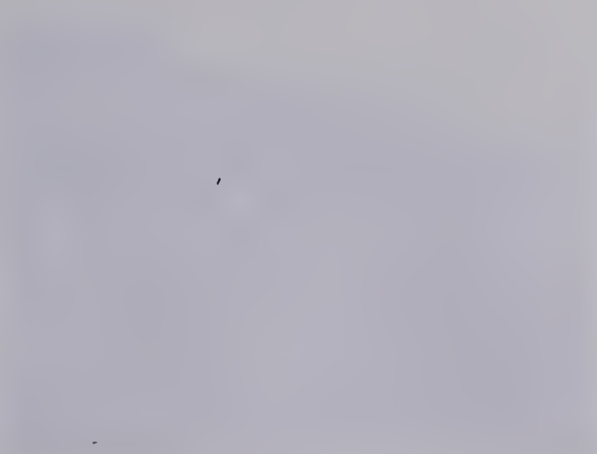
C - FRONTAL VIEW OF THE APPARATUS ATTACHED TO SUBJECT



A B C







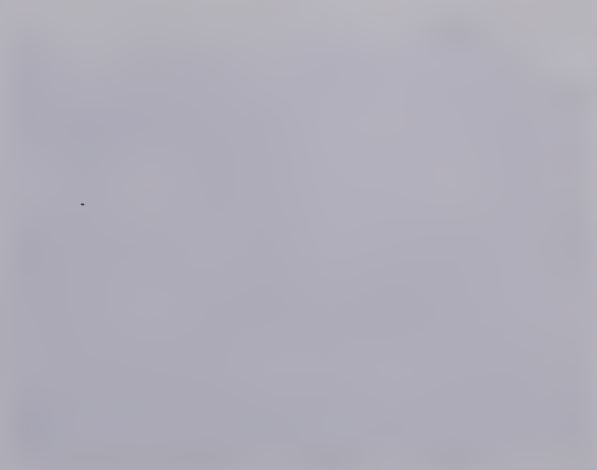
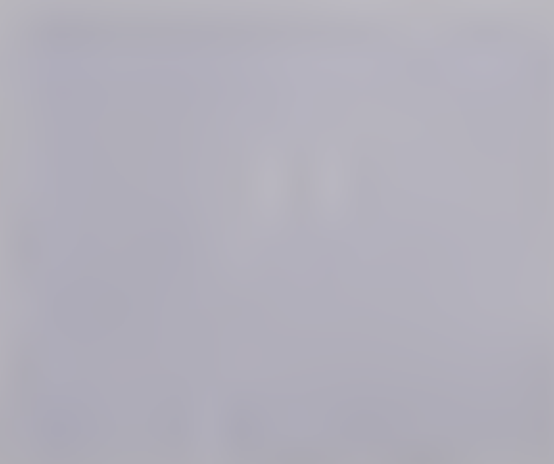



FIGURE 3

EIGHT STAGES OF FLIGHT

1. PRE FLIGHT (3 MINUTES).

2. PRE FLIGHT (2 MINUTES).

3. PRE FLIGHT (1 MINUTE).

4. TAKE OFF.

5. IN FLIGHT.

5. PRE LANDING.

7. LANDING.

8. POST LANDING.

1

2

3

4

5

6

7

8

of which the heart rate and respiratory rate monitoring stopped. Figure illustrates the eight phases of Flight Sequence.

The performance of each subject was evaluated by a means of the IPE Questionnaire on the basis of a single flight trial. The electronic recording equipment was removed and the subject was informed that his results would be forwarded to him when they had been analyzed.

VII. DATA ANALYSIS

The data collected for each subject included eight heart rate scores and eight respiration rate scores which were recorded throughout eight specific stages of the flight sequence (i.e. Pre-flight (3 minutes), Pre-flight (2 minutes), Pre-flight (1 minute), Take off, In Flight, Pre-Landing, Landing, and Post-landing)). These scores were descriptively analyzed when graphs were drawn showing:

1. Novice subjects' heart rate and respiration rate at eight phases throughout the flight sequence.
2. Experienced subjects' heart rate and respiration rate at eight phases throughout the flight sequence.
3. Novice good performers heart rate and respiration rate at eight phases throughout the flight sequence.
4. Experienced good performers heart rate and respiration rate at eight phases throughout the flight sequence.
5. Novice poor performers heart rate and respiration rate at eight phases throughout the flight sequence.

6. Experienced poor performers heart rate and respiration rate at eight phases throughout the flight sequence.

Two-factor analysis of variance (ANOVA 23) with repeated measures on factor 'B' were performed on respiration rate scores and heart rate scores between novice and experienced subjects in order to determine the significance of the differences between the two experience groups and their response patterns. To gain information regarding the relationship between experience and anxiety, T-tests (ANOVA 10) were performed in order to test the level of significance between the means of Trait and State anxiety scores between novice and experienced groups. Finally, the performance of each subject was rated by the IPEQ to distinguish good from poor performers in each experience group. These groups were compared descriptively in terms of anxiety level, respiration rate and heart rate in order to observe directly, relationships between performance and anxiety.

VIII. LIMITATIONS

1. While flight performance testing was restricted to wind conditions below 5 miles per hour gusts of wind may have occasionally influenced performance. However, this was not seen to have significantly affected pilot performance and results.

2. The weight of the recording system which was worn on the subject's back during the experiment could potentially influence flight performance slightly. However personal interviews indicated that the audio subcarrier system, specifically designed for the experiment did not influence body

mechanics to any extent throughout the flight.

IX. DELIMITATIONS

Findings of the present study were delimited by the following factors:

1. The sampling of subjects was limited to thirty male sport hang glider pilots between the ages of seventeen and twenty-six years, living in the Edmonton, Alberta area.

2. The measurement of State and Trait Anxiety was limited to Spielberger's State-Trait Anxiety Inventory.

3. The recording of heart rate and respiration rate was limited to the audio subcarrier system used in the study.

CHAPTER IV

RESULTS AND DISCUSSION

INTRODUCTION

A two-factor analysis of variance with repeated measures on eight timed responses yielded significant differences between the physiological responses of novice and experienced hang glider pilots.[1] These results in conjunction with the graphed profiles of group responses throughout the flight sequence further supports earlier findings (Fenz, 1976), relating physiological arousal to performance. The t-tests indicated a significant difference between A-State means of novice and experienced hang glider pilots while no significant difference between A-Trait means was noted among hang glider pilots.

PHYSIOLOGICAL RESPONSES

Respiration Rates of Novice Hang Glider Pilots Throughout the Flight Sequence

In Figure 4, the heavy line represents the mean scores of respiration rate of the novice hang glider pilots through a single flight sequence.

[1] $p < .05$ was accepted as the criterion level for significance in this study.

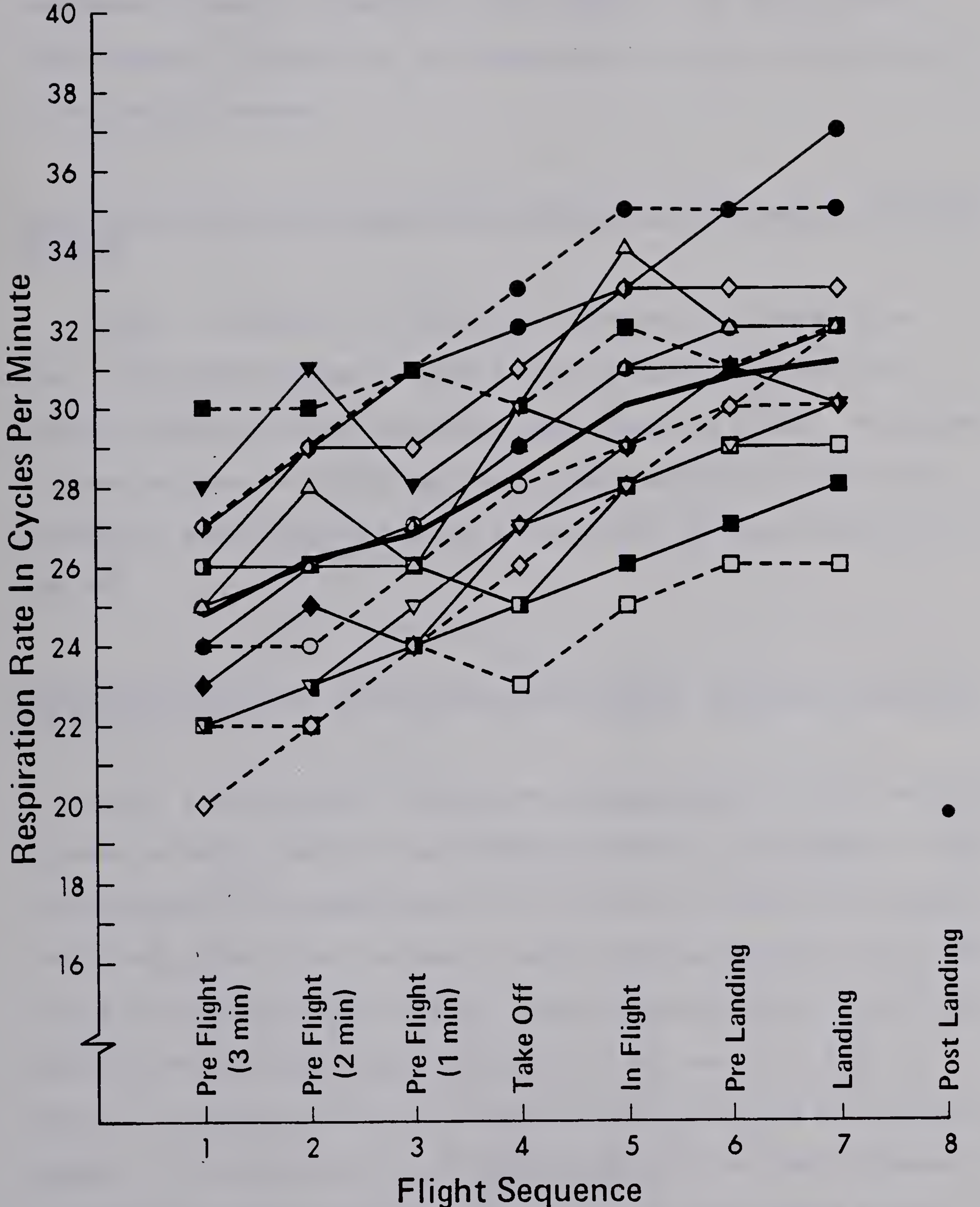


Figure 4 Respiration Rate of 15 Novice Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence. Heavy Line Indicates Average.

The overall pattern of the respiratory responses are displayed by a continuous increase in respiration rate throughout all phases of the flight sequence. Take-off to pre-landing shows the most marked increase in respiration response.

Respiration Rates of Experienced Hang Glider Pilots Throughout the Flight Sequence

Figure 5, indicates the respiratory responses of 15 experienced hang glider pilots through a single flight sequence. The heavy line represents the mean scores throughout eight phases of flight. Respiratory response patterns for this group shows a sharp increase in respiration through the three pre-flight phases followed by a decrease just prior to take off.

Respiration Rate of Novice and Experienced Hang Glider Pilots Throughout the Flight Sequence

Figure 6, demonstrates that in novice hang glider pilots, a continuous increase in respiration rate was produced during all seven phases of the flight sequence, from approximately 25-31 cycles per minute. The experienced hang glider pilots produced a double inverted U-shaped curve, with a sharp increase to slightly over 24 cycles per minute while in the final minute of the pre-flight stage, followed by a decrease just prior to take off. A slight increase or in-flight levelling occured just prior to landing. A two-way analysis of variance indicated that the difference in respiration rate between experienced and novice hang glider pilots was highly significant at .05 level of significance throughout the flight sequence. Table I illustrates these statistical results.

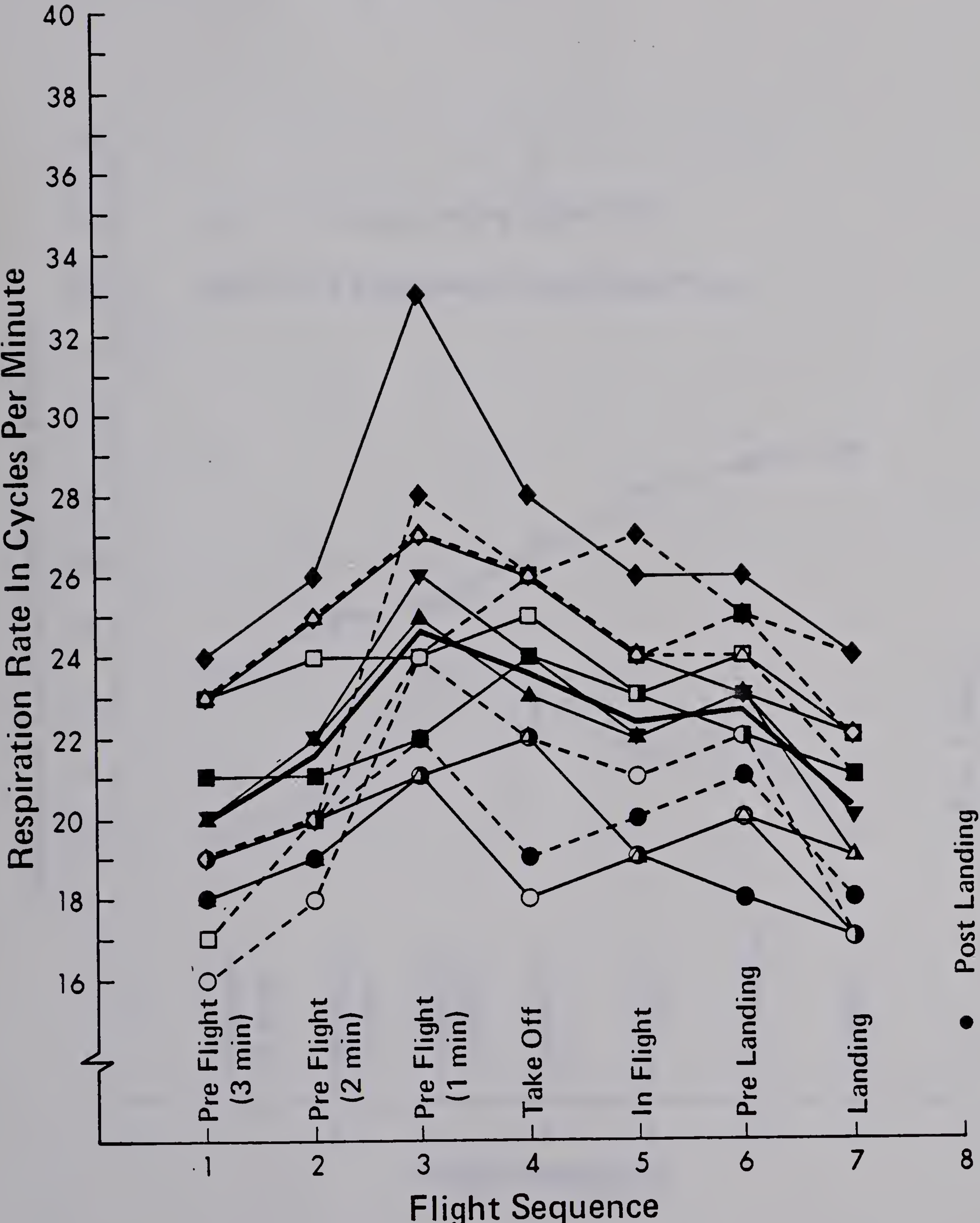


Figure 5 Respiration Rate of 15 Experienced Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence. Heavy Line Indicates Average.

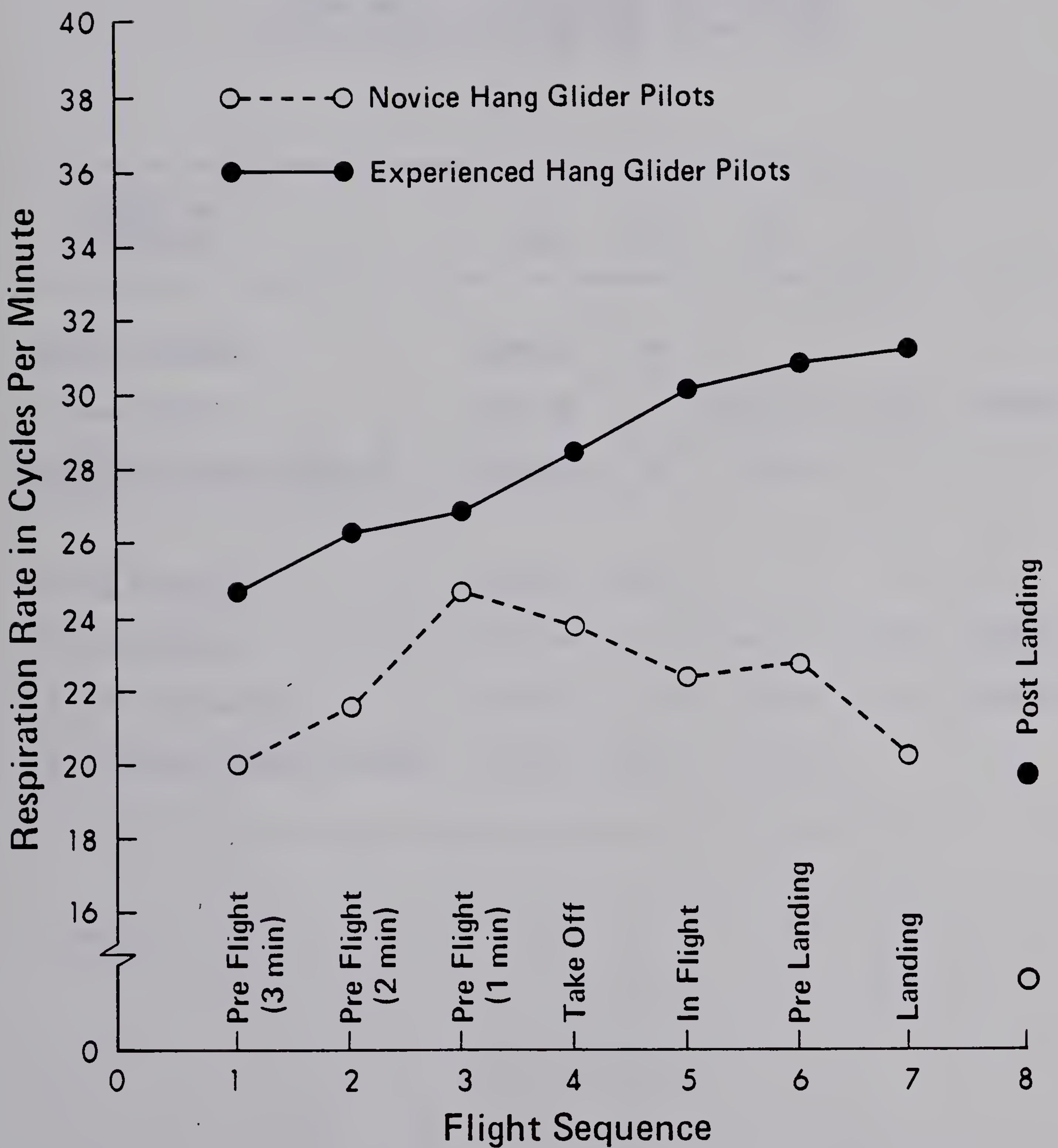


Figure 6 Respiration Rate of Experienced and Novice Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence.

TABLE I

SUMMARY OF THE ANALYSIS OF VARIANCE OF THE DIFFERENCE IN RESPIRATION RATE BETWEEN EXPERIENCED AND NOVICE HANG GLIDER PILOTS

SOURCE OF VARIATION	SS	DF	MS	F	P
Between Subjects	3392.44	29			
'A' Main Effects	2154.08	1	2154.08	48.70	.0000002
Subjects Within Groups	1238.37	28	44.23		
Within Subjects	2974.12	210			
'B' Main Effect	2062.97	7	294.71	114.87	.0000007
'A x B' Interaction	408.34	7	58.33	22.74	.00000013
'B' x Subjects Within Groups	502.87	196	2.56		

$p < .05$

Respiration Rate of Good and Poor Performers From Among Novice Hang Glider Pilots Throughout the Flight Sequence.

Figure 7, showing respiration rate of 5 good and 5 poor performers in the group of novice flyers, demonstrates that a difference between the two groups started to emerge before take off, the poor performers showing a continuous increase in respiration rate, while the good performers displayed a slight decrease prior to take off and a lowered level of respiration rate throughout all following phases of flight sequence. The autonomic response difference is quite evident throughout all phases of flight sequence.

Respiration Rate of Good and Poor Performers From Among Experienced Hang Glider Pilots Throughout the Flight Sequence.

Figure 8, which reports findings on respiration rate for good and poor performers among experienced flyers, displays a difference between the two groups, not only in an overall lower respiration rate throughout the flight sequence, but also in the marked drop after take off of the good performers.

Heart Rates of Novice Hang Glider Pilots Throughout the Flight Sequence

Heart rate is shown in Figure 9. The heavy line represents the median scores of heart rate in beats per minute for 15 novice hang glider pilots through a single flight sequence. The overall pattern of heart responses is similar to respiration responses in so far as a decrease does not occur throughout the sequence. However a levelling of heart rate response does occur between phase one and two of pre-flight. From

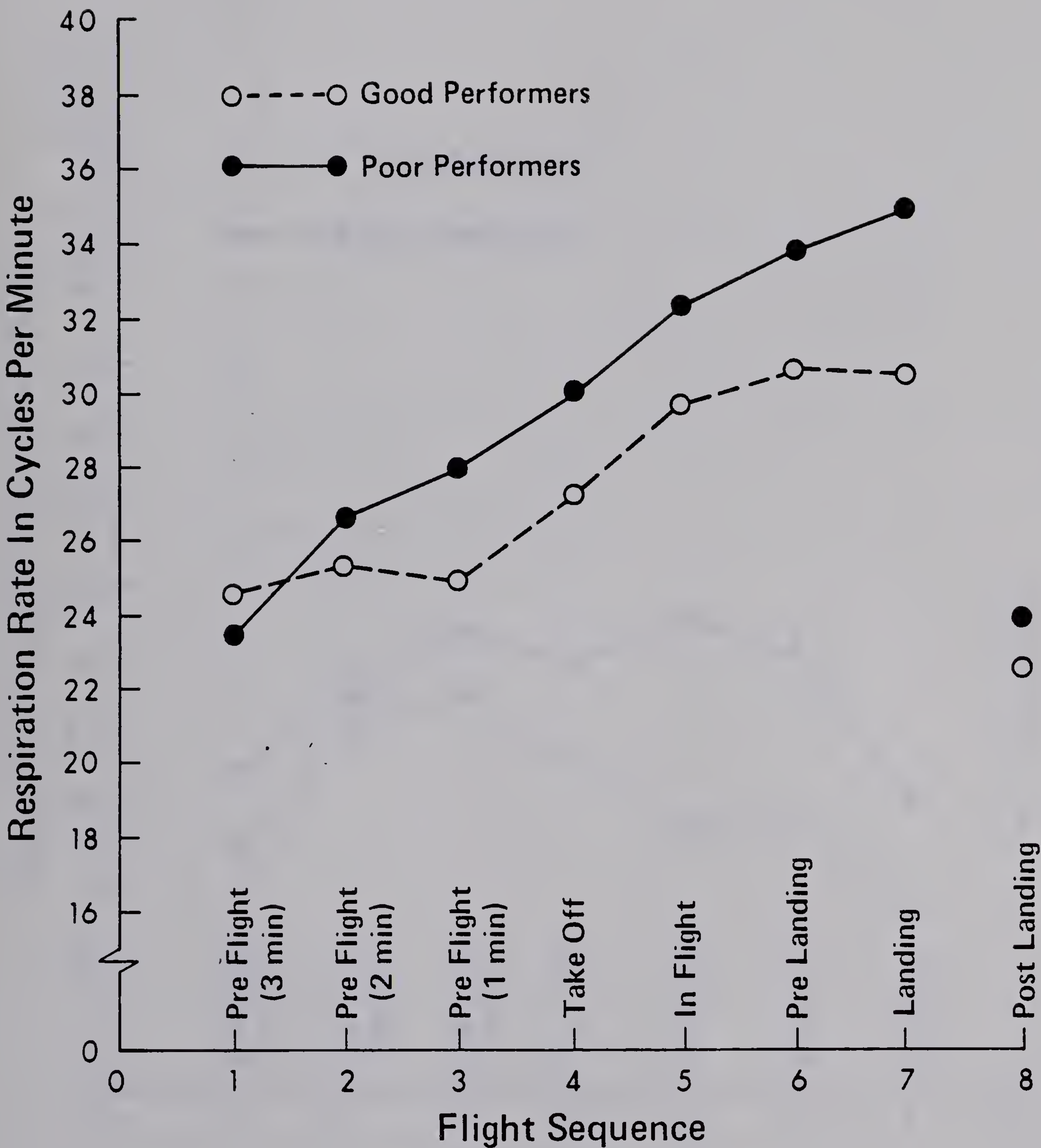


Figure 7 Respiration Rate of Good and Poor Performers from Among Novice Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence.

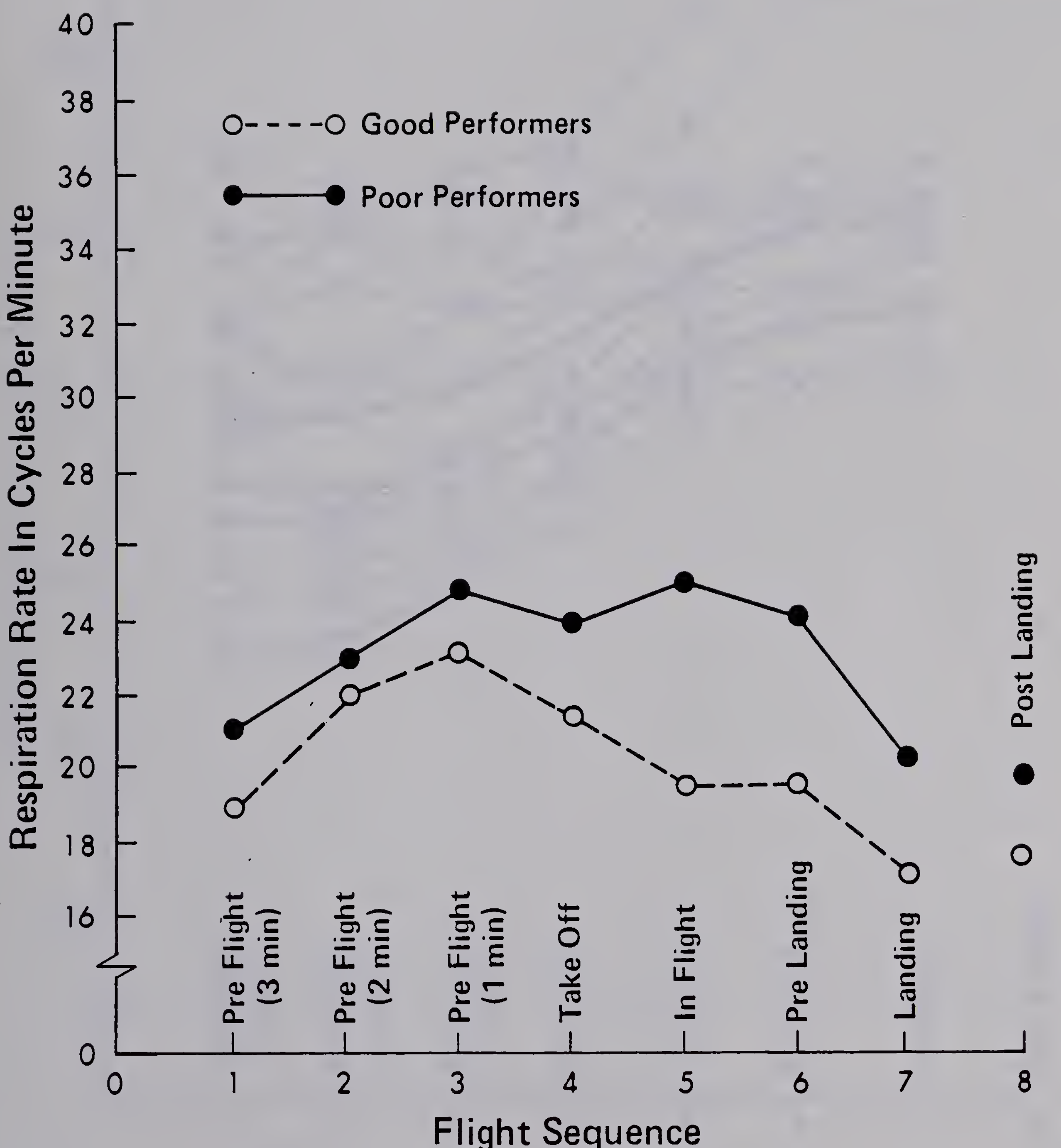


Figure 8 Respiration Rate of Good and Poor Performers from Among Experienced Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence.

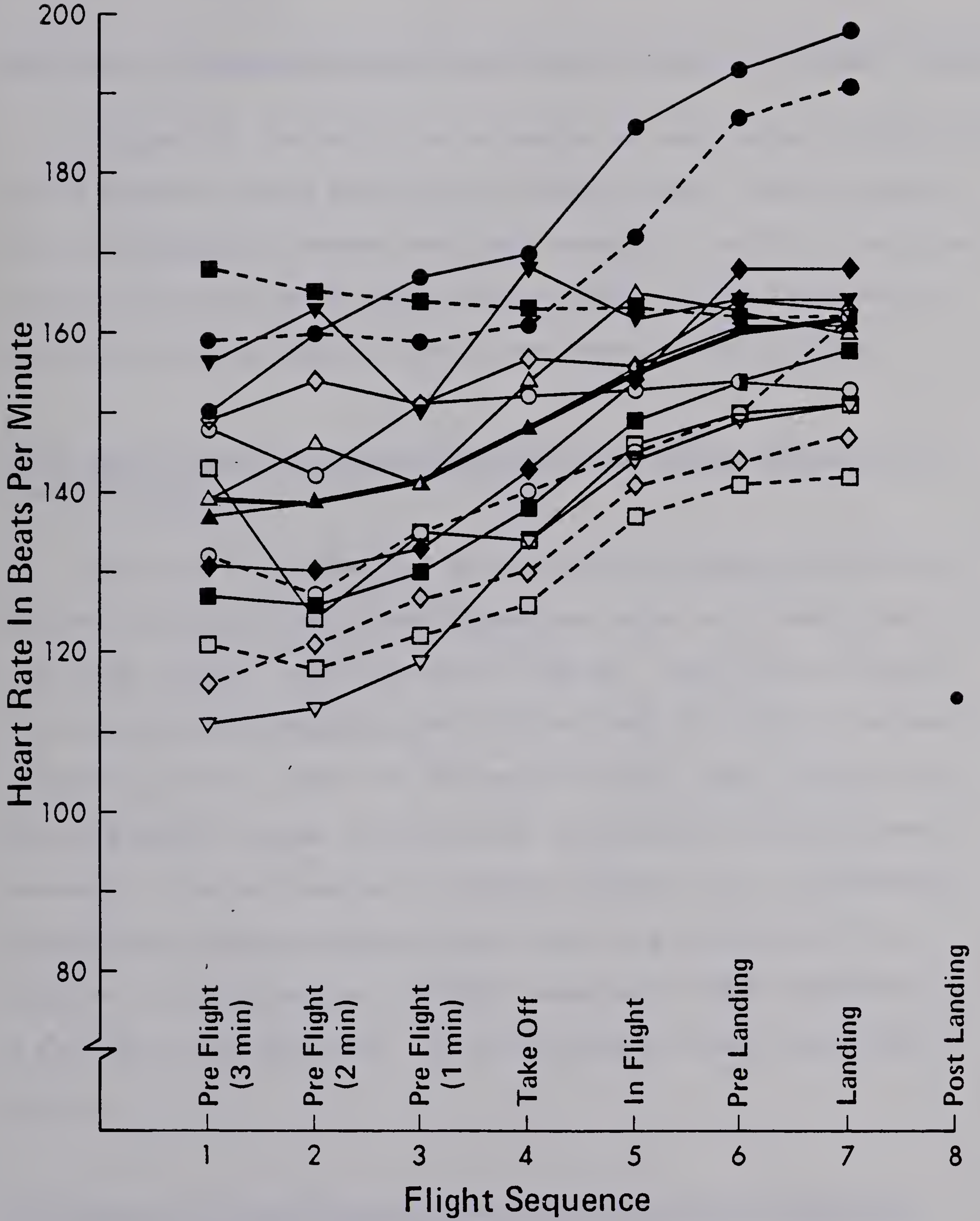


Figure 9 Heart Rate of 15 Novice Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence. Heavy Line Indicates Average.

phase two through to phase seven a marked increase in heart rate is noted.

Heart Rate of Experienced Hang Glider Pilots Throughout the Flight Sequence

In Figure 10, the heavy line represents the mean scores of heart rate for 15 experienced hang glider pilots through a single flight sequence. Two peaks appeared throughout the flight sequence; the first, just prior to take-off and the second just prior to landing. A sharp decrease in heart rate occurred directly after both of these phases of flight.

Heart Rate of Novice and Experienced Hang Glider Pilots Throughout the Flight Sequence

Figure 11, illustrates that in both novice and experienced groups, the same increase in heart rate response was noted up to phase three in the flight sequence until just before take off. From this point heart rate continued to increase in novice flyers until they landed, whereas in experienced flyers, heart rate declined from phase three to phase five and then showed a slight increase prior to landing followed by a sharp decrease. A two-way analysis of variance indicates that the difference in heart rate between experienced and novice hang glider pilots as a function of time throughout the flight sequence is highly significant at $p < .05$ level of significance. Table II illustrates these statistical results.

Heart Rate of Good and Poor Performers From Among Novice Hang Glider Pilots Throughout the Flight Sequence

Figure 12, showing heart rate of 5 good and 5 poor performers in the group of novice flyers, demonstrates that a marked difference between

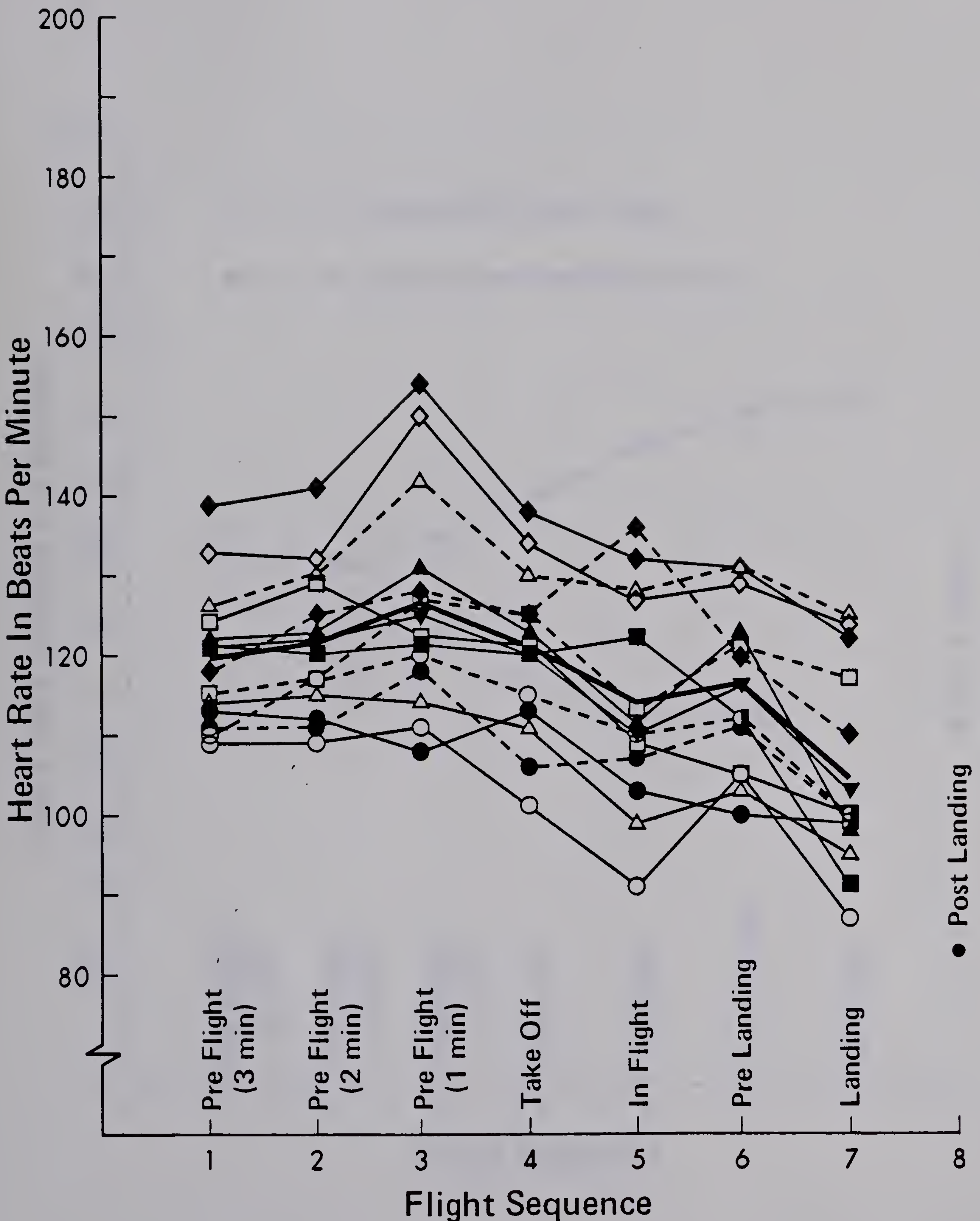


Figure 10 Heart Rate of 15 Experienced Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence. Heavy Line Indicates Average.

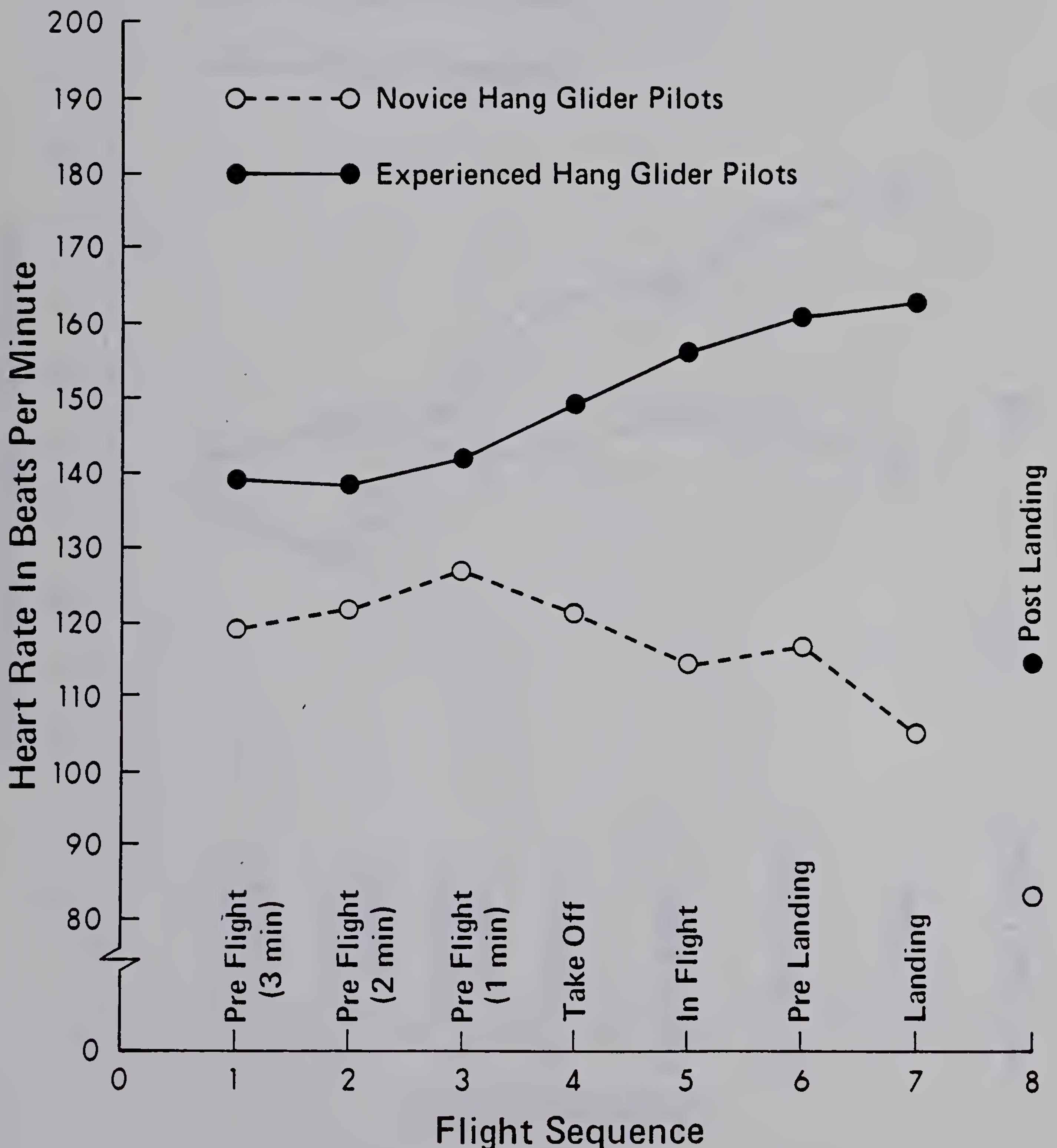


Figure 11 Heart Rate of Experienced and Novice Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence.

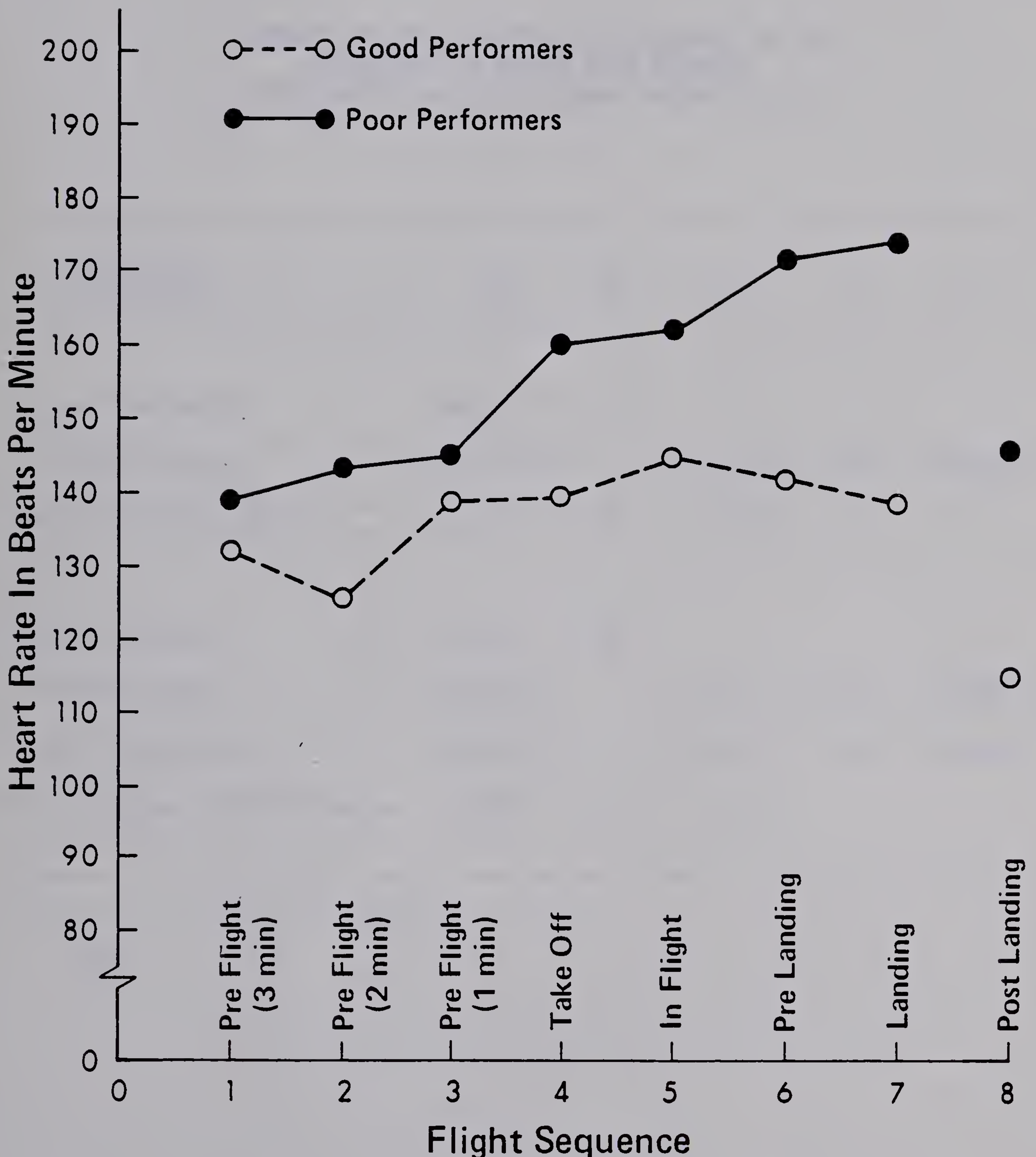


Figure 12 Heart Rate of Good and Poor Performers from Among Novice Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence.

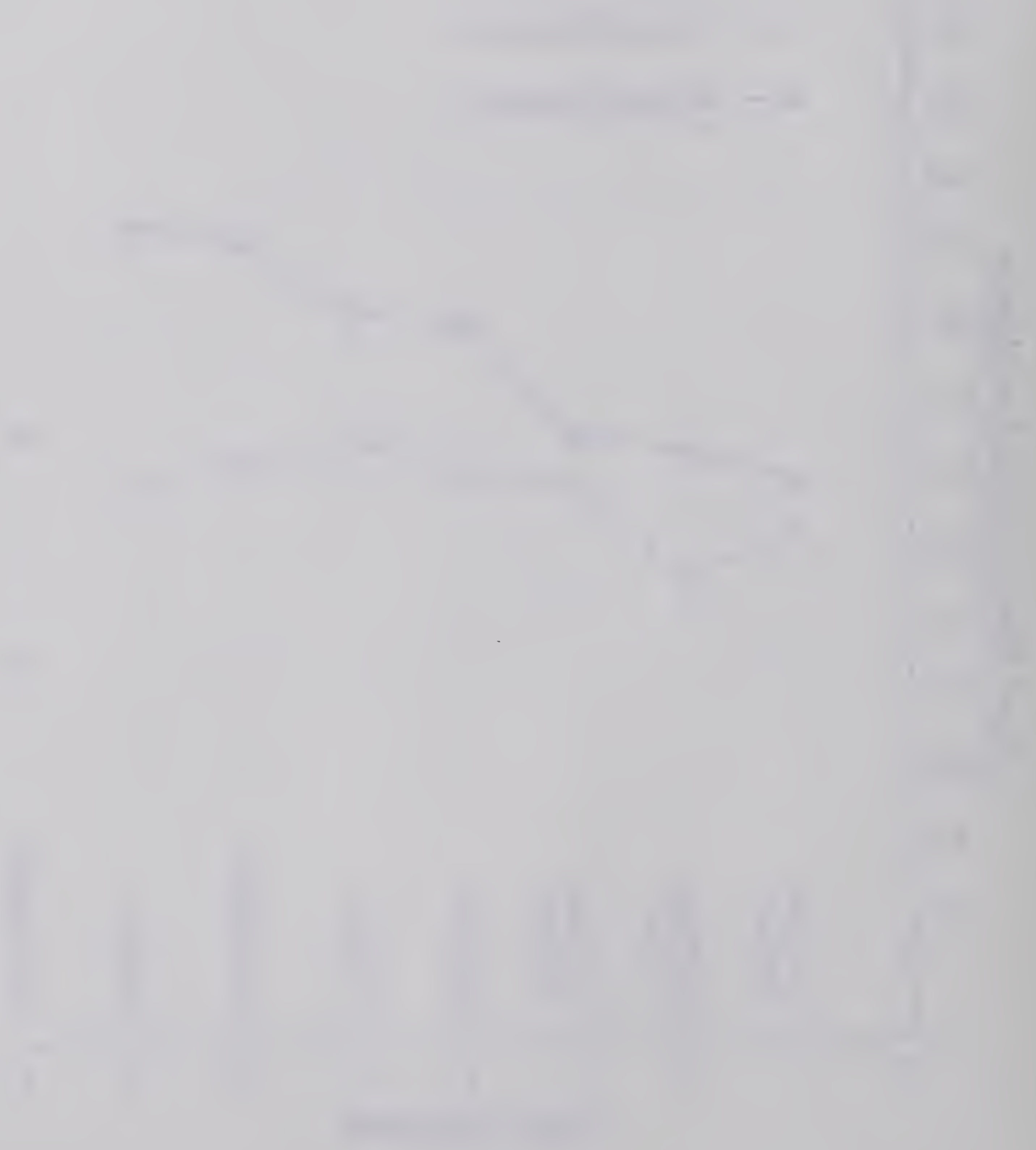


TABLE II

SUMMARY OF THE ANALYSIS OF VARIANCE OF THE DIFFERENCE IN HEART RATE BETWEEN EXPERIENCED AND NOVICE HANG GLIDER PILOTS

SOURCE OF VARIATION	SS	DF	MS	F	P
Between Subjects	89721.0	29			
'A' Main Effects	60132.19	1	60132.19	56.91	.0000006
Subjects Within Groups	29586.0	28	1056.64		
Within Subjects	51569.0	210			
'B' Main Effect	33370.31	7	4767.19	136.01	.0000005
'A x B' Interaction	11335.31	7	1619.33	46.20	.0000004
'B' x Subjects Within Groups	6870.0	196	35.05		

$p < 05$

the two groups exists, following phase three of the flight sequence. The mean heart rates of the poor performers climbs from 142 to 160 beats per minute during one minute before take off while good performers level off at 139 beats per minute through this phase. During phase five novice poor performers increased sharply while good performers continuously decreased in heart rate through all remaining phases of flight sequence.

Heart Rate of Good and Poor Performers From Among Experienced Hang Glider Pilots Throughout the Flight Sequence

The results for heart rate, shown in Figure 13, represent the mean heart response scores in beats per minute of 5 experienced good performers and 5 experienced poor performers throughout the single flight sequence. The most marked difference between the two groups occurs during the final minute of the pre-flight, where poor performers display a continuous increase in heart rate until pre-landing, while good performers showed a sharp decrease. However a slight increase from 100-105 beats per minute was noted between phase five and phase six.

Main Findings from Physiological Responses

1. The flying skill of a pilot relates strongly to the way in which he responds autonomically during the flight sequence.
2. The most adaptive response pattern is an increase in autonomic arousal early in the flight sequence, followed by a sharp decrease, just preceding take off and a slight increase or levelling during pre-landing.

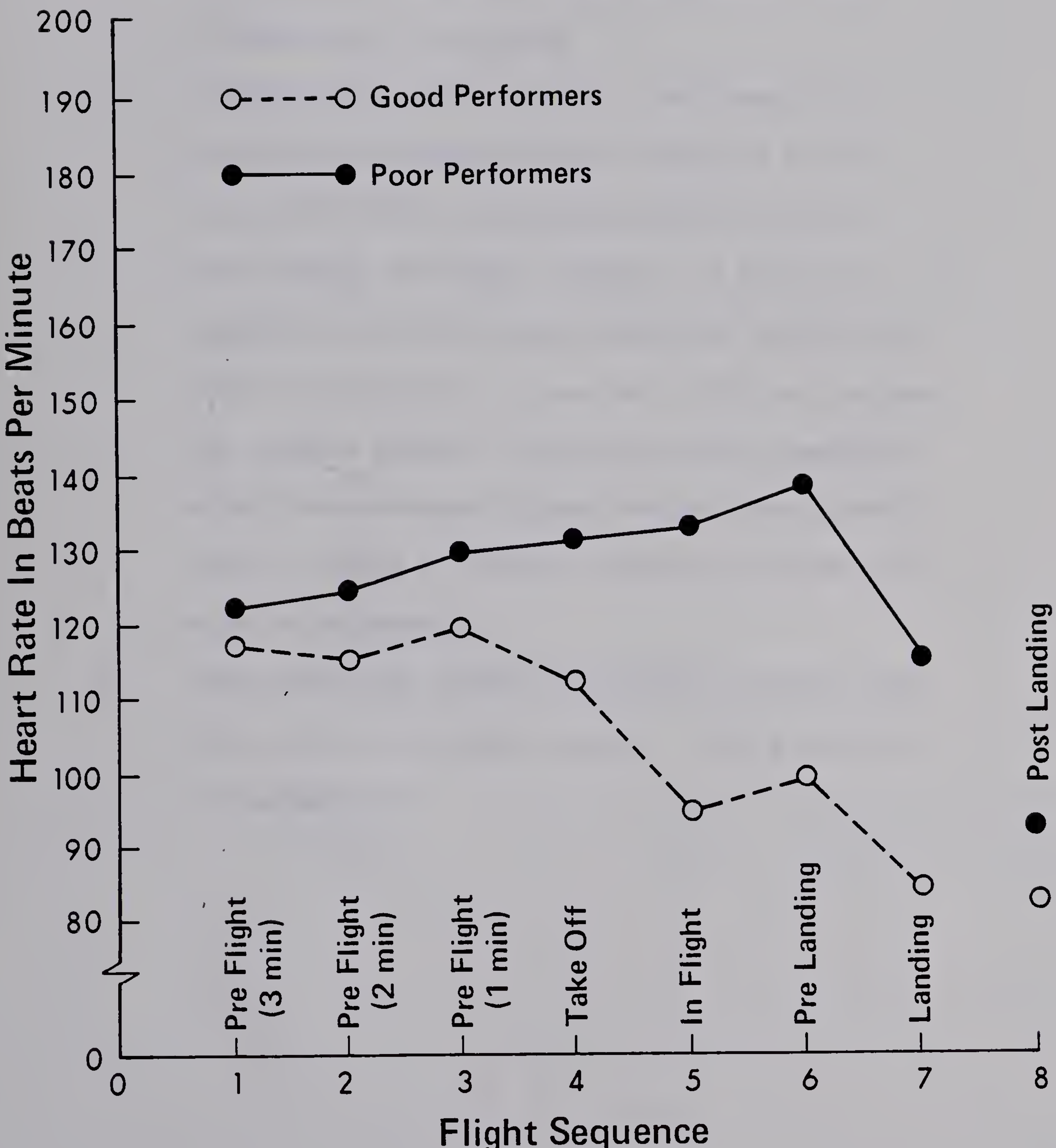
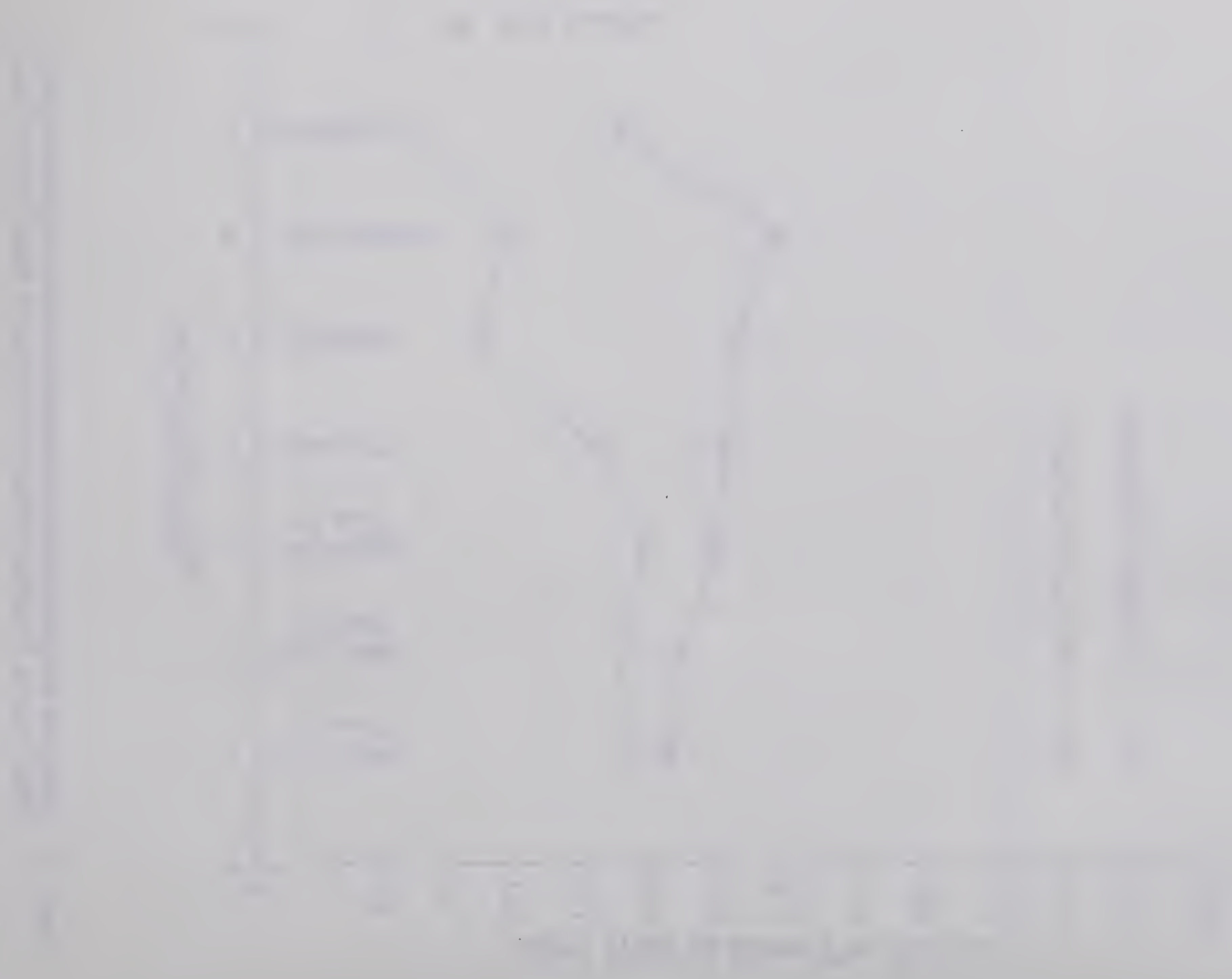


Figure 13 Heart Rate of Good and Poor Performers from Among Experienced Hang Glider Pilots as a Function of Events Throughout a Single Flight Sequence.



Epstein (1976) has suggested that fear about a stressful event, such as hang gliding, does not dissipate, but rather, in good performers, fear is inhibited or controlled.

3. All performers, good and poor, from among both novice and experienced groups, displayed a very similar increase in respiration and heart rate early during the flight sequence. It has been suggested (Fenz, 1976) that individual differences arise in the ability to cope with this early arousal; the response pattern of good performers especially among the experienced flyers, suggests anticipatory control causing an autonomic response decrease just prior to performance.

4. Comparisons made between respiration rate and heart rate of the same groups suggests strong positive correspondences.

ANXIETY INVENTORY

Trait Anxiety Scores of Novice and Experienced Hang Glider Pilots

Table III summarizes the t-test analysis of Trait Anxiety between novice and experienced hang glider pilots. A-Trait E represents the results of 15 experienced pilots while A-Trait N represents 15 novice pilots. No significant difference between the mean trait anxiety scores of both groups was noted. General feeling states in a non-stressful situation are similar in both novice and experienced hang glider pilots within this study.

TABLE III

RESULTS OF T-TESTS ANALYSIS ON
A-TRAIT E AND A-TRAIT N

VARIABLE	NUMBER OF CASES	MEAN	STANDARD ERROR	DEGREES OF FREEDOM	T VALUE
A-Trait E	15	36.20	5.94	28	-0.43
A-Trait N	15	37.13	5.68		

State Anxiety Scores of Novice and Experienced Hang Glider Pilots

Table IV summarizes the t-test analysis of State Anxiety between novice and experienced hang glider pilots. A-State E represents the results of 15 experienced pilots while A-State N represents 15 novice pilots. Significance was obtained by the 2 tailed test at the .05 level of significance.

The significantly higher A-State N score indicates that a higher level of pre-performance anxiety was experienced by novice hang glider pilots.

TABLE IV

RESULTS OF T-TESTS ANALYSIS ON
A-STATE E AND A-STATE N

VARIABLE	NUMBER OF CASES	MEAN	STANDARD ERROR	DEGREES OF FREEDOM	T VALUE
A-State E	15	40.26	9.74	28.0	-2.19***
A-State N	15	48.86	11.53		

*** Significant at the .05 level.

Mean State Anxiety Scores and Performance of Experienced Hang Glider Pilots

Table V summarizes the relationship between pre-performance anxiety and overall flight performance among experienced flyers. Poor performers experienced a much higher Mean State Anxiety Score than good performers, suggest that a higher level of pre-performance anxiety is present among poor performers of the same level of experience within the same sporting situation.

TABLE V

SUMMARY OF THE RELATIONSHIP OF MEAN STATE ANXIETY SCORES AND PERFORMANCE OF EXPERIENCED HANG GLIDER PILOTS

PERFORMANCE	MEAN STATE ANXIETY SCORES
Good	37.0
Average	33.20
Poor	50.60
Overall Scores	40.26

<u>Mean State Anxiety Scores and Performance of Novice Hang Glider Pilots</u>

Table VI summarizes the relationship between pre-performance anxiety and overall flight performance among novice flyers. Similar to experienced flyers, poor novice performers experienced a much higher Mean State Anxiety Score than good performers of the same level of experience within the same sporting situation.

TABLE VI

SUMMARY OF THE RELATIONSHIP OF MEAN STATE ANXIETY SCORES AND PERFORMANCE OF NOVICE HANG GLIDER PILOTS

PERFORMANCE	MEAN STATE ANXIETY SCORES
Good	42.0
Average	50.80
Poor	53.80
Overall Scores	48.86

Individual A-State Scores Against Performance for Experienced and Novice Hang Glider Pilots

A scatter diagram is presented in Figure 14. In this scatter diagram State anxiety scores for novice and experienced hang glider pilots are plotted against three levels of performance.

It can be observed from this diagram that low A-State scores are indicative of a good performance while high A-State scores tend to be indicative of a poor performance. This supports the second hypothesis, that sport performers at higher skill levels experience less pre-performance anxiety than performers at lower skill levels, assuming that athletes at higher levels of performance are more experienced and have developed effective coping responses to reduce the intensity of pre-performance anxiety. (Jones, 1976).

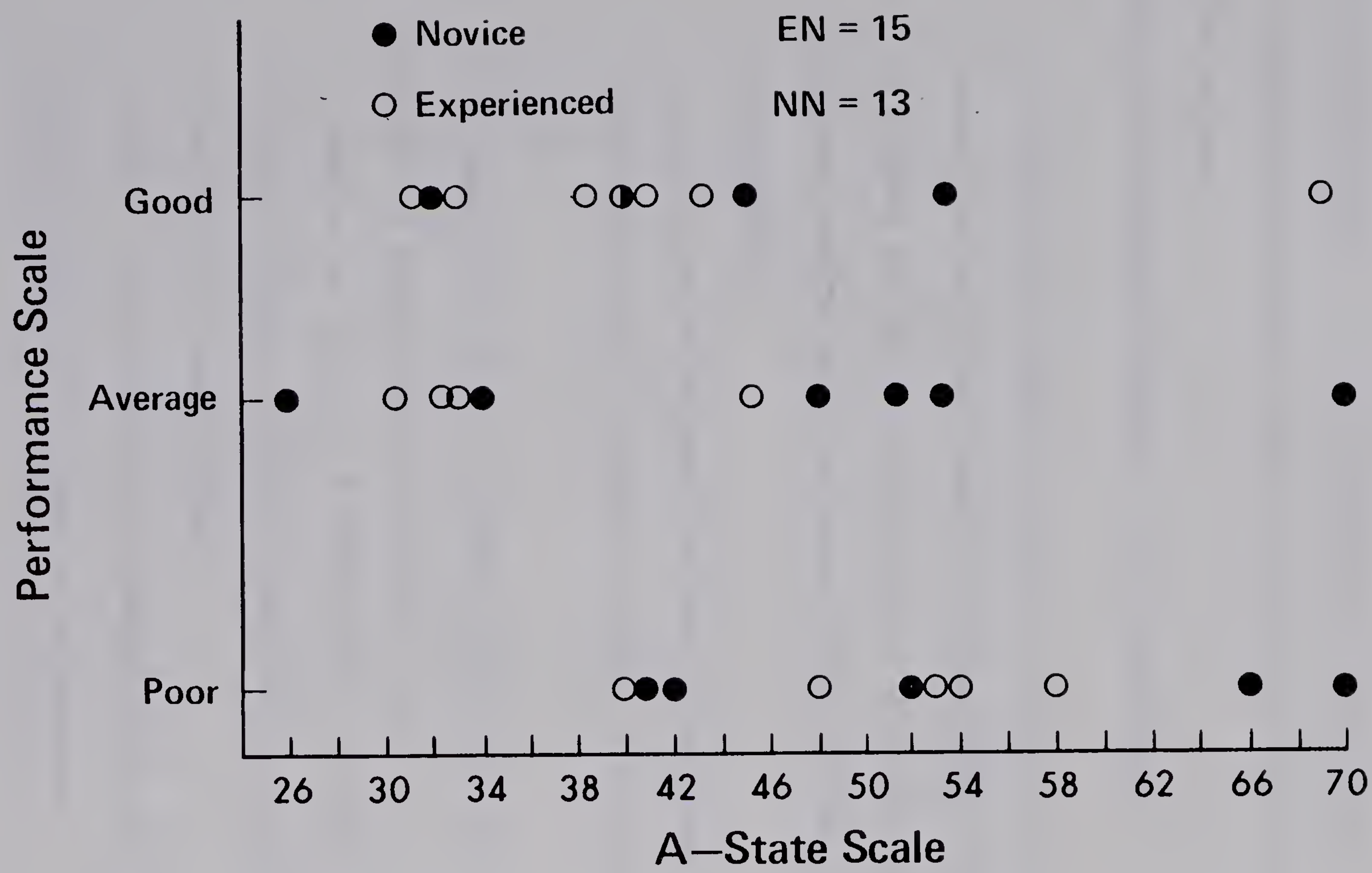


Figure 14 Scatter Diagram: Individual A-State Scores Against Performance For Experienced (E) and Novice (N) Hang Glider Pilots.

CHAPTER V

SUMMARY AND CONCLUSIONS

The primary purpose of this study was to examine the relationship between experience, autonomic arousal, anxiety and performance in sport hang glider pilots.

Specific sub-problems examined in this study were:

1. To observe and examine the level of autonomic arousal present in novice and experienced hang glider pilots.
2. To examine the relationship between autonomic arousal and performance among performers with the same level of experience.
3. To examine the relationship between situational anxiety (STATE) and anxiety proneness (TRAIT) in hang glider pilots.
4. To examine the level of A-STATE anxiety present in novice and experienced hang glider pilots.
5. To examine the level of A-STATE anxiety present in good and poor performers with the same level of experience in the sport of hang gliding.
6. To derive a more precise and comprehensive hypothesis relating arousal and anxiety to performance.

An additional purpose of the study was to determine possible differences in the optimal Pre-Performance Anxiety Level of the typical participant in sport hang gliding. A conceptual framework for Pre-

Performance Anxiety was developed first. It was proposed to regard high risk sport performances as a set of stressor stimuli which evokes psychological and physical threats to sport performers, thus creating Pre-Performance Anxiety. Pre-Performance Anxiety was also accompanied by varying states of physiological arousal among performers of different levels of sport experience. On the basis of the theoretical conceptualization of Pre-Performance Anxiety, a series of hypotheses were generated and subsequently tested to provide a better understanding of the pervasive phenomenon in sport performances.

Secondly, a theoretical examination of the relationship between Pre-Performance Anxiety and sport performance was carried out and expanded. A relationship between Level of Pre-Performance Anxiety and Level of Performance of performing subjects was theoretically established on the basis of the inverted U relationship between arousal and performance. Pre-Performance Anxiety as demonstrated in sport performers was related to Spielberger's State anxiety scale. The subjects of the study were 30 male hang glider pilots, divided into two groups based on hang gliding experience. Heart rate and respiration rate was monitored throughout each hang gliding performance. Anxiety levels were assessed with Spielberger's Trait and State Anxiety Inventories. The State scale was administered approximately one half hour before each subject's flight. During every flight, the performance of each subject was assessed by a qualified hang glider instructor on a three point scale (poor, average, good). Individual differences in anxiety scores and autonomic responses were then studied as a function of the individual's performance level.

The major findings and conclusions of the study were:

1. Anxiety levels of sport hang glider pilots were successfully discriminated between stressful and non-stressful performance situations by Trait and State Anxiety Inventories.
2. Hang glider pilots demonstrated a significantly higher State Anxiety during pre-performance than in a non-sport performance situation as measured by the A-Trait scale.
3. Pre-Performance Anxiety greatly attributed to the autonomic response of performing hang glider pilots.
4. No significant differences in Trait anxiety were found between experienced and novice hang gliding pilots.
5. Novice hang glider pilots demonstrated significantly higher State Anxiety scores than experienced hang glider pilots in the same performance situation.
6. Good and poor performers differed from each other with respect to Pre-Performance Anxiety and Physiological Arousal Levels. Good performers demonstrated a lower level of State Anxiety than poor performers as measured by Spielberger's Trait and State Anxiety Inventory. Poor performers demonstrated markedly higher respiration and heart rate scores than good performers throughout the flight sequence.
7. The most adaptive physiological response pattern for performing hanger pilots was found to resemble a double

inverted U.

8. The Audio Subcarrier System was successfully used in measuring autonomic responses (heart rate and respiration rates) of performing hang glider pilots.

9. STAI A-State scale was successfully used in measuring the presence and strength of State Anxiety levels of athletes in stressful pre-performance situations.

A number of implications are suggested by this study. It is quite evident from this study that effective coping mechanisms are necessary to deal with pre-performance anxiety in order to enhance performance.

Voluntary control of the inhibitory physiological and psychological reactions to pre-performance anxiety could effectively alter incompatible pre-performance anxiety levels.

The most effective response patterns to pre-performance anxiety might best be obtained through the constructive use of the following techniques.

1. Control of Breathing: Since the study indicates that an increase in respiration rate beyond an optimal level has a debilitating effect upon performance; the voluntary control of breathing rate would focus the performer's respiratory response within a desirable pattern for optimal performance.

2. Augmented Cardiac Feedback: Since heart rate is also a physiological indicator of arousal level, cardiac feedback would give the performer his exact heart rate during all phases of pre-performance,

performance and past performance.

This feedback could be used to develop effective coping mechanisms in order to deal with high levels of anxiety and also to develop the most adaptive response patterns which would most effectively enhance performance.

3. Self Instruction: This phase of training technique would involve the individual familiarizing himself with:

(i) the most adaptive physiological response patterns for performance required;

(ii) all aspects of the equipment being used for the performance and all monitoring equipment.

(iii) all geographical meterological considerations regarding take-off and landing.

(iv) all safety precautions regarding flight failure.

4. Reinforcement: A very important parameter of reducing anxiety is confidence. The instructor must establish a certain level of confidence in the flyer in order to reduce his fear of failure and focus his attention on more adaptive mechanisms of performance.

Specific recommendations which follow from this study suggest that effective coping mechanisms are necessary to deal with high states of pre-performance anxiety. Through the use of telemetry and audio recording devices, physiological monitoring is quite feasible during the pre-performance period. Future studies using techniques of reinforcement, self-instruction, control of breathing and augmented cardiac feedback, to teach more adaptive ways to deal with pre-performance anxiety are needed in order to establish effective training procedures to control the fear associated with pre-performance anxiety.

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APPENDICES

APPENDIX A

RAW SCORES OF ANXIETY RESPIRATION RATE, HEART RATE AND PERFORMANCE

TABLE VII

RAW SCORES OF SUBJECTS ON EACH VARIABLE

EXPERIENCED HANG GLIDER PILOTS

I.D. NO.	SEX	ANXIETY TRAIT	STATE STATE	RESPIRATION RATE FLIGHT SEQUENCE 1	2	3	4	5	6	7	8	HEART RATE FLIGHT SEQUENCE 1	2	3	4	5	6	7	8	PERFORMANCE RATING
E1	M	32	38	19	20	21	18	19	20	17	13	109	109	111	104	91	105	87	71	+1
E2	M	36	40	16	18	24	22	21	22	17	12	110	117	120	115	110	112	99	80	+1
E3	M	22	31	21	21	22	24	23	22	21	16	121	120	121	120	122	112	91	72	+1
E4	M	37	43	20	22	25	23	22	23	19	11	122	123	131	123	112	123	98	77	+1
E5	M	38	33	20	22	26	24	22	23	20	15	121	122	125	121	110	116	103	82	+1
E6	M	39	33	19	20	22	19	20	21	18	12	111	111	118	106	107	111	100	81	0
E7	M	45	32	20	23	26	24	22	23	20	15	121	122	125	121	110	116	103	83	0
E8	M	35	45	18	19	21	22	19	18	17	13	113	112	108	113	103	100	99	78	0
E9	M	35	26	18	19	21	22	19	20	19	12	114	115	114	114	99	105	95	84	0
E10	M	35	30	17	20	24	26	24	25	22	17	115	117	127	125	113	121	117	88	0
E11	M	46	48	23	24	24	25	23	24	22	16	124	129	122	121	100	115	100	79	-1
E12	M	30	40	23	25	27	26	24	24	21	15	126	130	142	130	128	131	125	89	-1
E13	M	33	54	19	20	28	26	27	25	24	18	118	125	128	125	136	120	110	89	-1
E14	M	38	53	23	25	27	26	24	23	22	18	133	132	150	134	127	129	124	94	-1
E15	M	42	58	24	26	33	28	26	26	24	20	139	141	154	138	132	131	122	95	-1

TABLE VIII

NOVICE HANG GLIDER PILOTS

I.D. NO.	SEX	ANXIETY TRAIT	STATE STATE	RESPIRATION RATE FLIGHT SEQUENCE 1	2	3	4	5	6	7	8	HEART RATE FLIGHT SEQUENCE 1	2	3	4	5	6	7	8	PERFORMANCE RATING
N1	M	41	45	26	26	26	25	28	29	29	23	143	124	135	134	146	150	151	104	+1
N2	M	32	40	22	23	24	25	26	27	28	21	127	126	130	138	149	154	158	111	+1
N3	M	51	53	22	22	24	23	25	26	26	19	121	118	122	126	137	141	142	100	+1
N4	M	34	40	30	30	31	30	32	31	32	24	168	165	164	163	163	162	162	112	+1
N5	M	35	32	25	28	26	30	34	32	32	21	139	146	141	154	165	163	160	115	+1
N6	M	37	51	24	26	27	29	31	31	32	20	137	139	141	148	156	161	161	114	0
N7	M	41	48	27	29	29	31	33	33	33	18	149	154	151	157	156	164	163	112	0
N8	M	32	34	22	23	25	27	28	29	30	16	111	113	119	134	144	149	151	107	0
N9	M	46	68	23	25	24	26	29	31	30	14	131	130	133	143	154	168	168	123	0
N10	M	38	53	28	31	28	30	29	31	30	13	156	163	150	168	162	164	164	120	0
N11	M	31	42	25	26	27	29	31	32	32	16	148	142	141	152	153	154	153	118	-1
N12	M	33	66	26	29	31	32	33	35	37	26	150	160	167	170	186	193	198	136	-1
N13	M	38	52	20	22	24	26	28	30	30	17	116	121	127	130	141	144	147	101	-1
N14	M	36	41	24	24	26	28	29	30	32	23	132	127	135	140	145	150	162	119	-1
N15	M	32	68	27	29	31	33	35	35	35	26	159	160	159	161	172	187	191	130	-1

APPENDIX B

STATE - TRAIT ANXIETY INVENTORY

SELF-EVALUATION QUESTIONNAIRE

HOW DO YOU FEEL RIGHT NOW

NAME ____________________ NUMBER OF MINUTES/HOURS PRIOR TO COMPETITION ___________ DATE ________

DIRECTIONS: Mark the answer which seems to describe your present feelings best --- YOUR FEELINGS AT THIS VERY MOMENT.

1. I feel calm	not at all	some-what	moder-ately so	very much so
2. I feel secure	not at all	some-what	moder-ately so	very much so
3. I am tense	not at all	some-what	moder-ately so	very much so
4. I am regretful	not at all	some-what	moder-ately so	very much so
5. I feel at ease	not at all	some-what	moder-ately so	very much so
6. I feel upset	not at all	some-what	moder-ately so	very much so
7. I am presently worrying over possible misfortunes	not at all	some-what	moder-ately so	very much so
8. I feel rested	not at all	some-what	moder-ately so	very much so
9. I feel anxious	not at all	some-what	moder-ately so	very much so
10. I feel comfortable	not at all	some-what	moder-ately so	very much so
11. I feel self-confident	not at all	some-what	moder-ately so	very much so
12. I feel nervous	not at all	some-what	moder-ately so	very much so
13. I am jittery	not at all	some-what	moder-ately so	very much so
14. I feel high strung	not at all	some-what	moder-ately so	very much so
15. I am relaxed	not at all	some-what	moder-ately so	very much so
16. I feel content	not at all	some-what	moder-ately so	very much so
17. I am worried	not at all	some-what	moder-ately so	very much so

18.	I feel over-excited and "rattled"	not at all	some-what	moder-ately so	very much so
19.	I feel joyful	not at all	some-what	moder-ately so	very much so
20.	I feel pleasant	not at all	some-what	moder-ately so	very much so

YOUR SELF-EVALUATION QUESTIONNAIRE

HOW DO YOU GENERALLY FEEL

NAME ________________ NUMBER OF YEARS IN COMPETITION ____ ANY PREVIOUS ATHLETIC INJURY (DESCRIBE) __________

SPORT __________ AGE ___

DIRECTIONS: Mark the answer which seems to describe your general feelings best.

1. I feel pleasant	almost never	some-times	often	almost always
2. I tire quickly	almost never	some-times	often	almost always
3. I feel like crying	almost never	some-times	often	almost always
4. I wish I could be as happy as others seem to be	almost never	some-times	often	almost always
5. I am losing out on things because I can't make up my mind soon enough . .	almost never	some-times	often	almost always
6. I feel rested	almost never	some-times	often	almost always
7. I am "calm, cool and collected" . . .	almost never	some-times	often	almost always
8. I feel that difficulties are piling up so that I cannot overcome them	almost never	some-times	often	almost always
9. I worry too much over something that really doesn't matter	almost never	some-times	often	almost always
10. I am happy	almost never	some-times	often	almost always
11. I am inclined to take things hard . .	almost never	some-times	often	almost always
12. I lack self-confidence	almost never	some-times	often	almost always
13. I feel secure	almost never	some-times	often	almost always
14. I try to avoid facing a crisis or difficulty	almost never	some-times	often	almost always
15. I feel blue	almost never	some-times	often	almost always

16.	I am content	almost never	some- times	often	almost always
17.	Some unimportant thought runs through my mind and bothers me	almost never	some- times	often	almost always
18.	I take disappointments so keenly that I can't put them out of my mind	almost never	some- times	often	almost always
19.	I am a steady person	almost never	some- times	often	almost always
20.	I get in a state of tension or turmoil as I think over my recent concerns and interests	almost never	some- times	often	almost always

APPENDIX C

INSTRUCTOR'S PERFORMANCE EVALUATION QUESTIONNAIRE

INSTRUCTOR'S PERFORMANCE EVALUATION QUESTIONNAIRE

NAME OF PILOT: ______________________________

STATUS: EXPERIENCED VS. NOVICE

AGE: ______________________________

	Poor	Average	Good
HOW WAS HIS PERFORMANCE:	(-1)	(0)	(+1)

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